

**CHAPTER 2. PART 27
AIRWORTHINESS STANDARDS
NORMAL CATEGORY ROTORCRAFT**

SUBPART A - GENERAL

AC 27.1. § 27.1 APPLICABILITY.

a. Explanation. This section prescribes the rotorcraft categories eligible for certification under this Part. There is no minimum weight limit for certification under Part 29; however, Part 27 is applicable to rotorcraft with maximum weights of 6,000 pounds or less.

(1) Without Engine Isolation. For single-engine rotorcraft and multiengine rotorcraft without engine isolation, the height-velocity (HV) diagram is conducted with sudden failure of all engines, and the takeoff maneuver must pass through the clear area of the diagram to the 50-foot point with all engines operating.

(2) With Engine Isolation. Part 27 multiengine rotorcraft may be certificated with engine isolation features (reference paragraph AC 27 MG 3). These rotorcraft are not required to meet the Part 29, Category A, performance requirements, and continued flight after an engine failure is not assured since under some conditions failure of the remaining engine may occur after a limited time. The takeoff is conducted with all engines operating, while the height-velocity diagram is determined with the most critical engine inoperative. If complete Part 29, Category A, design features and performance are achieved, the Category A performance may be included in the FAA/AUTHORITY-approved portion of the Rotorcraft Flight Manual although this performance is not required by the regulations.

b. Procedures. None.

AC 27.1A. § 27.1 (Amendment 27-33) APPLICABILITY.

a. Explanation. Amendment 33 formally introduced the requirements for certification of a Part 27 rotorcraft to Category A design and performance standards. These standards are found in Appendix C of Part 27. The establishment of Category A design and performance for multiengine Part 27 rotorcraft is still voluntary. If so requested, the corresponding AC 29-2C material applies.

b. Procedures. None

AC 27.1B § 27.1 (Amendment 27-37) APPLICABILITY.

a. Explanation. Amendment 27-37 increases the normal category rotorcraft maximum gross weight limit from 6,000 to 7,000 pounds and introduces new airworthiness requirements. The gross weight increase was intended to compensate for past regulatory actions that, in effect, cumulatively increased the gross weight of normal category rotorcraft. The amendment also adds an explicit nine-passenger seat limitation. The new airworthiness requirements were intended to increase the level of safety to support a potential increase in the number of passenger seats associated with the increase in maximum gross weight limit.

b. Procedures. None

AC 27.2 § 27.2 (Amendment 27-28) SPECIAL RETROACTIVE REQUIREMENTS.

a. Explanation.

(1) Amendment 27-28 requires a combined shoulder harness and safety belt (also called a torso restraint system) at each occupant's seat for all rotorcraft manufactured after September 16, 1992.

(2) The design features of the restraint system are mainly contained in this section rather than having to refer to other sections within Part 27 except for a general reference to the differing strength standards between earlier static strength only standards and the static and dynamic strength standards of Amendment 27-25.

(3) Combined safety belt and harness strength standards system follows:

(i) Those rotorcraft type designs certificated to static strength standards alone prior to Amendment 27-25, such as 4 g's forward may use belt and harness systems, characterized as 1,500 pounds strength systems, provided they comply with those standards. TSO C22f and earlier restraint systems have such ratings. A combined belt and harness with a 1,500 pounds rating, which comply with the Part 27 standards for the rotorcraft type design, but are not necessarily TSO approved, may be approved as a part of the type design. Such design information for a non-TSO'd item would be included in a note on the aircraft type certificate data sheet (TCDS) or specification sheet by part number as "required equipment." TSO C114-approved torso restraint systems, characterized as 3,000 pounds strength system, may be used provided the design features comply with this section, but no special information on the TCDS is necessary.

(ii) Those rotorcraft type designs certified to dynamic test requirements of Amendment 27-25 should use torso restraint systems approved under TSO C114 or approved under equivalent standards such as those contained in Part 27.

(4) Load Distribution and Design Requirements. Although not stated in § 27.2, a 60 percent and 40 percent load distribution between the safety belt and harness, respectively, is required in § 27.785(g). The safety belt should withstand 100 percent if the safety belt is capable of being used alone. Also, the safety belt or harness attachments to the seat or structure should include the 1.33 factor described in § 27.785(f)(2) of Amendment 27-21 for those rotorcraft with that certification criteria or should include the 1.15 factor as described in § 27.625 (and predecessor Part 6) standards for those rotorcraft with the earlier certification criteria. A factor is used whether test or analysis methods are used for static substantiation of the seating systems. Refer to paragraph AC 27.785c(i) (§ 27.785).

(5) The companion operating rule change of Amendment 91-220, amended § 91.205 (Amendment 91-223), affecting the aircraft equipment requirements. Operating rule § 91.107(a) already requires use of the harness whenever the aircraft seat is so equipped.

b. Procedures.

(1) A TSO-approved combined safety belt and harness or torso restraint system may be used provided the installation requirements in § 27.2 are satisfied. A combined belt and harness (not necessarily TSO approved) may be approved as a part of the rotorcraft type design and so noted on the aircraft specification or TCDS.

(2) Structural analysis or static test may be used. For those rotorcraft designs that are subject to the dynamic test standards of § 27.562, the torso restraint system is required to be qualified for the particular use or installation in each rotorcraft type design. A dynamic test may be required for alternate restraint systems as well as the originally approved system. TSO C114 approval does not constitute approval for installation of a restraint system in a rotorcraft design subject to dynamic test.

(i) AC 20-137 dated March 30, 1992, concerns in part the dynamic test standards of Amendment 27-25.

(ii) AC 23-4 dated June 20, 1986, concerns static test procedures for small airplane seats and restraint systems. (Certain small airplanes manufactured after December 12, 1986, should have harnesses for each seat also.) A test proposal for rotorcraft installations may adopt procedures appropriate to the particular installation. The 60/40 percent distribution is sufficiently achieved when the blocks in Figure 4 of AC 23-4 are used.

(iii) The static design side load for the harness installation may be proven by test or analysis using the load distribution previously noted. For "older" designs, the side load of § 27.561(b)(3)(iii) is 2.0g, and for later designs (Amendment 27-25 and later), it is 8.0g.

AC 27.2A § 27.2 (Amendment 27-37) SPECIAL RETROACTIVE REQUIREMENTS.

a. Explanation. Amendment 27-37 specifies that for any change in type design to a rotorcraft that increases the passenger-seat capacity to a number greater than seven (and limited to a maximum of nine) the rotorcraft must meet all the applicable paragraphs of this Part in effect on October 18, 1999, regardless of the original certification basis. Additionally, the amendment allows for an increase in maximum gross weight from 6,000 pounds up to 7,000 pounds for previously certified rotorcraft provided there is no increase in the maximum passenger-seat capacity beyond that for which the rotorcraft was certificated on October 18, 1999. If a passenger-seat capacity increase is requested in addition to an increase in gross weight above 6,000 pounds, then, once again, all applicable paragraphs of this Part in effect on October 18, 1999, must be met.

b. Procedures. None.